

REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHW-23-07

Modeling Hybrid Strategy Use and Switching in Decision Tasks

PROJECT DESCRIPTION: Decision making research has explored choice strategies and corresponding search and verbal behaviors. Recent work with Bayesian inference increased scientific knowledge by using these behaviors to infer strategy use and switching. However, it has some limitations: it excludes learning, assumes people possess specific strategies a priori, and finds best matching strategies across stimuli not allowing stimuli-specific strategies (e.g., memory). The ACT-R cognitive architecture could address limitations and complement this research by including learning to explore if/how it leads: cue exploration, development of cue-leveraging strategies, and use of stimuli specific or hybrid strategies incorporating memory. This effort will increase scientific knowledge about strategy development, interactions with memory, and increasing performance without increasing cognitive cost. The selected applicant will gain knowledge of relevant psychological literature, experience with the ACT-R cognitive architecture, and statistical analyses for model fitting and comparison. As this research will be presented in some capacity, the applicant will also gain experience with scientific writing, communication, and paper/poster preparation.

ACADEMIC LEVEL: Master's, PhD

DISCIPLINE NEEDED:

- Cognitive Science or Psychology
- Computer Science
- Human Factors

RESEARCH LOCATION: Virtual or In-Person at Wright-Patterson Air Force Base, Dayton, Ohio

RESEARCH MENTOR: Alexander Hough, PhD

Human Factors/Industrial-Organizational Psychology, Wright State University, 2021



Dr. Hough is a Research Psychologist in the 711th Human Performance Wing, Warfighter Interactions & Readiness Research Division, Cognitive Modeling Branch. His background is in decision making, problem solving, reasoning, and coordination within game theory. He has published work related to understanding in humans and machines, the identification of strategy use and detection of strategy switching in decision making and categorization tasks, and identifying factors of coordination failure in groups of humans. His current efforts include: 1) building a foundation for a cognitive theory and model of anticipatory thinking to support complex decision making and planning, 2) leveraging analogical reasoning research to extend ACT-R cognitive architecture capabilities to facilitate resolving gaps in knowledge and generalization, and 3) evaluating methods to detect and model (ACT-R) fatigue, its cognitive mechanisms, and effects on performance. *Photo courtesy of the U.S. Air Force Research Laboratory.*